

What is claimed is:

- Sub 917
1. A self-sustained pulsating laser diode which having a double-heterostructure minimally comprising:
 - a cladding layer of a first conductivity type;
 - 5 a multi-quantum well active layer; and
 - a cladding layer of a second conductivity type each being arranged on a semiconductor substrate of the first conductivity type, wherein the number of said quantum wells being at least 5 and no greater than 10; and
 - 10 said layer thickness of a flat part of said cladding layer having a current blocking structure is at least 300nm and no greater than 500nm;
 - and further wherein a carrier density in said flat part of the cladding layer having a current blocking structure is at
 - 15 least $1 \times 10^{17} \text{cm}^{-3}$ and no greater than $5 \times 10^{17} \text{cm}^{-3}$.
 2. A self-sustained pulsating laser diode which having a double-heterostructure minimally comprising:
 - a cladding layer of a first conductivity type;
 - a multi-quantum well active layer; and
 - 20 a cladding layer of a second conductivity type each being arranged on a semiconductor substrate of the first conductivity type, wherein an effective refractive index difference parallel to the layer is at least 7×10^{-4} and no greater than 3×10^{-3} , and further wherein a carrier density in
 - 25 a flat part of said cladding layer having a current blocking structure is at least $1 \times 10^{17} \text{cm}^{-3}$ and no greater than $5 \times 10^{17} \text{cm}^{-3}$.
 3. A self-sustained pulsating laser diode according to claim 1, wherein said cladding layer is made of a semiconductor that includes AlGaInP, and the said active

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Sub 2/a

1. a cladding layer of a first conductivity type;
 a multi-quantum well active layer; and
 a cladding layer of a second conductivity type each being
 arranged on a semiconductor substrate of the first
 5 conductivity type, wherein the number of said quantum wells
 being at least 5; and
 said layer thickness of a flat part of said cladding layer
 having a current blocking structure is at least 300nm;
 and further wherein an effective refractive index difference
 10 parallel to the layer (Δn) is at least 7×10^{-4} and no greater
 than 3×10^{-3} .

10. A self-sustained pulsating laser diode according to
 claim 9, said effective refractive index difference parallel
 to the layer (Δn) is around 1×10^{-3} .

15 11. A self-sustained pulsating laser diode according to
 claim 1, wherein said carrier density in said flat part of
 the cladding layer having a current blocking structure is less
 than $3 \times 10^{17} \text{ cm}^{-3}$.

20 12. A self-sustained pulsating laser diode according to
 claim 2, wherein said carrier density in said flat part of
 the cladding layer having a current blocking structure is less
 than $3 \times 10^{17} \text{ cm}^{-3}$.

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